



MF-108M CLUSTER FLUX

USER'S MANUAL



WELCOME TO THE WORLD OF MOOGERFOOGER® ANALOG EFFECTS MODULES!

Your MF-108M Cluster Flux is a rugged, professional-quality instrument, designed to be at home on stage or in the studio. Its great sound and jaw-dropping effects come from state-of-the-art analog circuitry, designed and handcrafted by our team at MOOG Music in Asheville, North Carolina.

The MF-108M is rooted in the analog wizardry of Bob Moog's moogerfooger designs. It is a direct descendent of the original Moog® modular synthesizers and professional rack effects.

Your Cluster Flux offers two basic functions: A dual-range Bucket Brigade Device (BBD) Delay Line designed for very short delay times and a multi-waveform Low Frequency Oscillator (LFO) capable of modulating the Delay Line for a variety of effects including Chorus, Flanging and Vibrato.

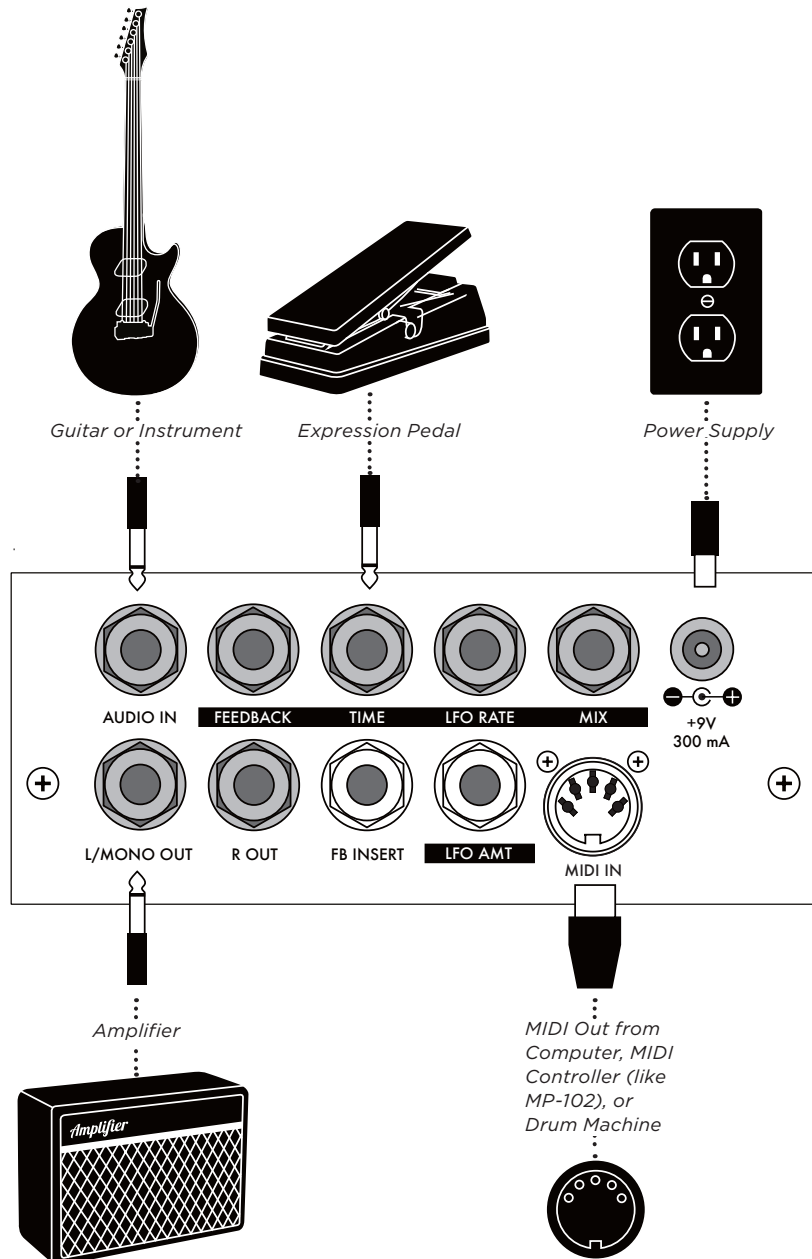
Several of the performance parameters are voltage-controllable. This means you can use expression pedals, a MIDI-to-CV converter or any other source of control voltage, such as other moogerfoogers to play your MF-108M.

In addition, the front panel rotary controls and switches can be controlled through the use of MIDI and the LFO can be synced to a MIDI Clock.

While you can use it on the floor like a conventional effects box, your Cluster Flux is much more versatile. Its sound quality is higher than most fixed-function "stomp boxes" you may be accustomed to. You will find that your Cluster Flux is a deep electronic musical resource that offers a very large range of analog sound processing possibilities.

GETTING STARTED

Here are some simple instructions on how to plug in and try your new MF-108M.



1. Unpack your Cluster flux and gently tap the wooden sidepieces of your new moogerfooger to wake it up after the long journey to its new home.

2. Connect the instrument cable from your sound source to the **AUDIO IN** jack. You can feed virtually any instrument or line-level signal through your MF-108M.

3. If you plan on using MIDI, connect a MIDI Cable from the out on the MIDI controller of your choice to the MF-108M's MIDI In.

NOTE: The Cluster Flux defaults to MIDI Channel one. Make sure your MIDI controller is transmitting on MIDI Channel one.

4. Connect an instrument cable from the **L/MONO** Out jack to a line-level input on your amp or mixer. Turn the volume control on your amp down but not off.

5. Using the supplied power adapter, plug the cord into the +9V' jack. Then plug the power adapter itself into a power voltage receptacle.

6. Notice that the **BYPASS LED** is green. This indicates that the MF-108M's effect is on. Red indicates that the effect is OFF (bypassed). Make sure the Cluster Flux effect is off by pressing the BYPASS switch before continuing.

*Note: the **CLUSTER FLUX** requires a +9VDC rated for at least 300 mA. **CENTER POSITIVE** power supply*

7. Play your instrument (or signal source). Adjust the volume control on your amplifier so the sound level is comfortable.

8. Set the MF-108M panel controls to the settings shown in figure 1 to explore the flanging effects of the Cluster Flux, or figure 2 to explore the Chorus effects of the Cluster Flux.

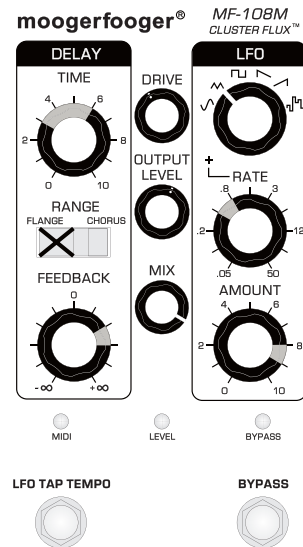
9. Turn on the MF-108M and play your instrument at its maximum level. Set the **DRIVE** control so the **DRIVE** indicator lights up yellow with the peaks of the input signal. Adjust the **OUTPUT** control so the Cluster Flux's effected signal is about the same loudness as the bypassed signal. You can also use the **OUTPUT** as a boost if you like.

10. Low-pitched, sustaining sounds with a bright timbre will work best to learn the sounds of your new Cluster Flux. Because the Cluster Flux was designed with far more range control than traditional Flanger and Chorus devices, you will discover a much larger palette of tones and effects

1. CLASSIC FLANGING

This effect features an up-and-down modulation of the input signal. Some describe it as a whooshing or jet plane sound.

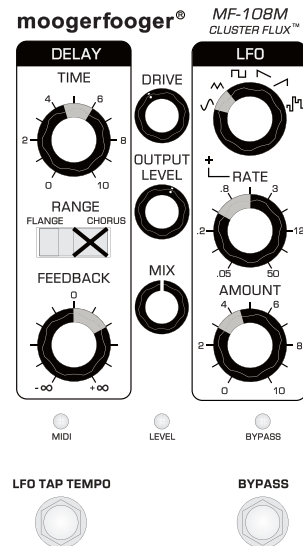
- Move **TIME** left to raise flanging frequency and right to lower it
- Try negative **FEEDBACK** for a lower pitched, hollow flange
- For best flanging results **MIX** control should be mostly wet
- As **RATE** increases, try decreasing the **AMOUNT** for more musical results



2. CLASSIC CHORUS

This effect features a subtle up-and-down modulation of the input signals' pitch. With a 50-50 mix of wet and dry signal, the result is a lush, swirling tone.

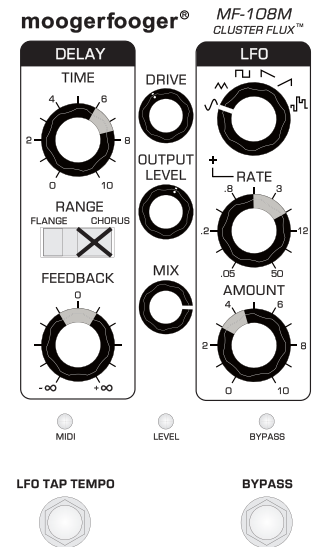
- Longer **TIME** settings cause a more audible pitch modulation
- Adding **FEEDBACK** to a Chorus effect gives it a metallic edge
- For best results **MIX** should be set to center position
- As **RATE** increases, try decreasing the **AMOUNT** for more musical results



3. VIBRATO

This effect features a slight up-and-down modulation of the input signals' pitch monitoring only the wet signal.

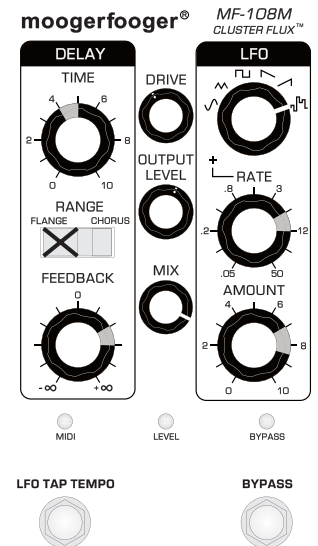
- Adding **FEEDBACK** to vibrato gives it a metallic edge
- The sine wave offers the most natural finger vibrato sound
- Increasing the **RATE** modifies the speed of up and down vibrato. This will also increase the audible pitch modulation
- As **RATE** increases, try decreasing the **AMOUNT** for more musical results



4. RANDOM FLANGE

This effect features a rhythmic random LFO step modulation of the flange effect.

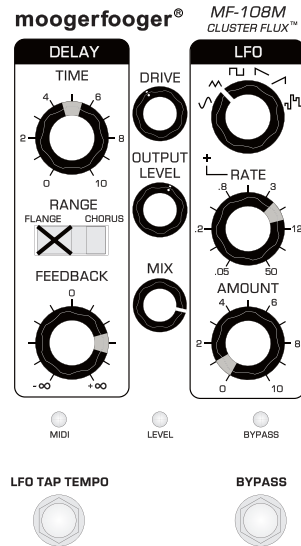
- Negative **FEEDBACK** gives this effect a deeper and more hollow tone
- The LFO waveform rotary switch set to random produces a random level each LFO cycle
- The **MIX** control should be set to mostly wet for flange effects



5. PEDAL FLANGE

This setup requires an Expression Pedal such as the Moog EP-2. Pedal Flanging allows real-time control of the flange frequency and can be played like a wah-wah effect.

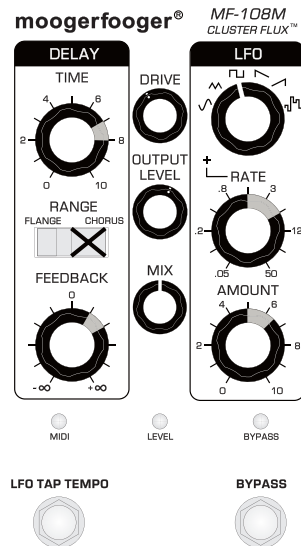
- Connect an EP-2 or other compatible expression pedal to the **TIME** control voltage input
- Set **TIME** at center position to get full sweep from the expression pedal
- Negative **FEEDBACK** gives this effect a deeper more hollow tone
- Try a little **AMOUNT** to add modulation to the pedal flange effect
- The **MIX** control should be set almost all the way up for this effect



6. SQUARE WAVE CHORUS

The **LFO** square wave can be used for creative rhythmic and pitch modulation effects. This effect features a sudden up-and-down modulation of the input signals' pitch, with a 50-50 mix of wet and dry signal.

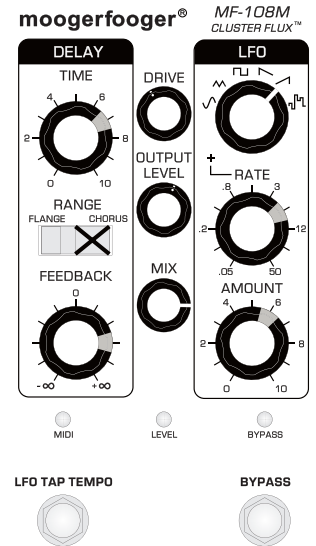
- Tune the **TIME** control in conjunction with the **AMOUNT** for a harmonic trill effect
- Adding **FEEDBACK** will increase retention of pitch modulation with sudden changes of the square wave modulation
- For best Chorus results, **MIX** control should be set to center position



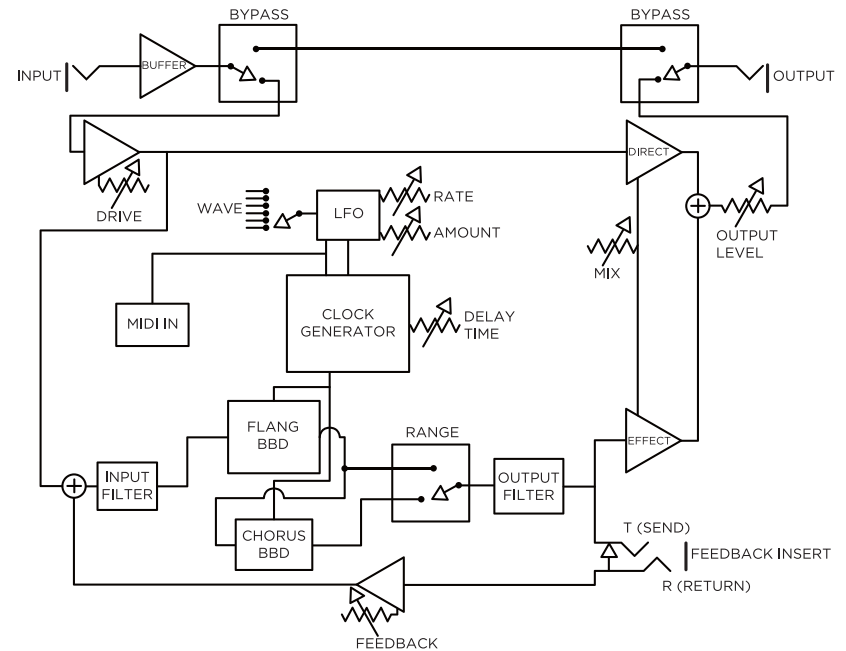
7. RAMP WAVE PITCH MOD

The **LFO** ramp wave can be used for creative rhythmic pitch cluster effects. This unusual effect features a rising modulation of the pitch followed by a sudden drop.

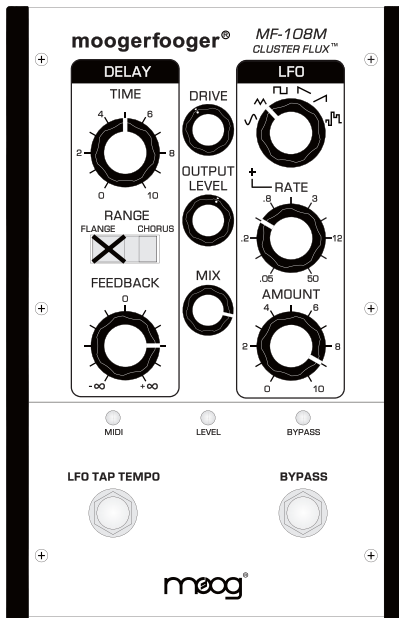
- Tune the **TIME** control in conjunction with the **AMOUNT** and **RATE** controls for the desired range of pitch modulation.
- Adding **FEEDBACK** will increase retention of pitch modulation
- Be sure to try the Sawtooth wave with these settings
- Set **MIX** to mostly wet



CLUSTER FLUX SIGNAL PATH



THE CLUSTER FLUX FRONT PANEL



DRIVE Control - Sets the input sensitivity of the Cluster Flux. This control is only active when the Effect is on. The available gain is from -7dB to +28dB nominal. The Cluster Flux is designed to work with instrument or line-level signals.

LEVEL LED - Works in conjunction with the **DRIVE** control. Red indicates clipping. Yellow indicates the nominal signal level for best signal-to-noise ratio. Green indicates the presence of signal below the nominal level.

*Note: For most instruments, the best approach is to set the **DRIVE** level so the **LEVEL LED** lights up mostly yellow. It is okay to drive the Cluster Flux into clipping/distortion if that sound is desired. If using an instrument with a wide dynamic range, you may want to insert a compressor prior to the input of the Cluster Flux for the best signal to noise ratio without clipping.*

OUTPUT LEVEL - Sets the strength of the Cluster Flux Output at both the Left and Right Audio Outputs. This control is only active when the effect is on. The Output Level control is designed so a boost, attenuation or no change can be achieved with any Drive setting.

MIX - Sets the blend ratio of dry to wet signal. This control is only active when the effect is on. Counterclockwise allows only the dry signal to pass to the Outputs. Clockwise allows only the wet signal to pass to the Outputs.

Any position between the two will blend Wet and Dry signal to the outputs.

DELAY TIME - Sets the length of Delay from the **BBD** delay line based on the Range switch setting. In Flange Mode, with **AMOUNT** set to 0, the delay time changes from .6 msec to 10 msec nominal. In Chorus mode this change is 5 msec to 50 msec nominal.

RANGE - Sets the range of delay times available to the **DELAY TIME** control. Flange selects a range of shorter delay times while Chorus selects a range of slightly longer delay times.

FEEDBACK - Sets the amount of **BBD** output fed back into the input of the **BBDs**. In Flange Mode, this is used to increase the sharpness and intensity of peaks in the frequency response of the comb filter. Both Positive and Negative Feedback are available, with zero feedback at mid-position.

In Flange Mode, Positive Feedback emphasizes all the harmonics of a fundamental frequency equal to the inverse of the Delay time - For instance 10 msec Delay creates a comb filter with a fundamental frequency of 100 Hz and emphasis at 200 Hz, 300 Hz, 400 Hz, 500 Hz, etc. Negative Feedback shifts the frequency response spectrum down by one octave which causes only odd harmonics to be emphasized. For instance, a 10 msec delay time with negative feedback creates a comb filter with a fundamental frequency of 50 Hz and harmonic emphasis at 150 Hz, 250 Hz, 350 Hz, 450 Hz, etc.

In Chorus mode, because the delay time is usually longer than the time period of the fundamental frequency of the input signal, the difference in tone between positive and negative feedback is much less noticeable.

WARNING: The Cluster Flux Feedback control is designed to drive the delay line into self-oscillation. This means the Cluster Flux is capable of producing a tone without any audio signal present. **Tones produced by self-oscillating feedback may be much stronger than normal signal levels, so watch your speakers and ears.**

Oscillation begins at the 4th indicator lines both left and right of the Feedback controls' mid position.

LFO WAVEFORM - Selects the LFO waveform for modulation of the Delay Time. There are six waveforms available: Sine, Triangle, Square, Sawtooth, Ramp and Random Stepped waveforms. Note: that with LFO Amount at zero, no modulation will be heard.

LFO RATE - Sets the frequency of modulation of the Delay line by the LFO. The Rate can be varied from .05 Hz to about 50 Hz. The LFO Rate LED indicates both the rate and waveform of the current LFO settings. The LED is **RED** when the Rate is set from the front panel, **GREEN** when the rate is set by the Tap Tempo switch, and **YELLOW** when the LFO is synced to MIDI clock. When synced to MIDI clock, the Rate control is quantized to select only rhythmic subdivisions of the MIDI clock tempo.

LFO AMOUNT - Sets the overall amount of modulation of the delay time by the LFO.

Note: As the LFO Amount increases, the functional range of the Delay Time control is decreased, so that the maximum and minimum delay times are not exceeded.

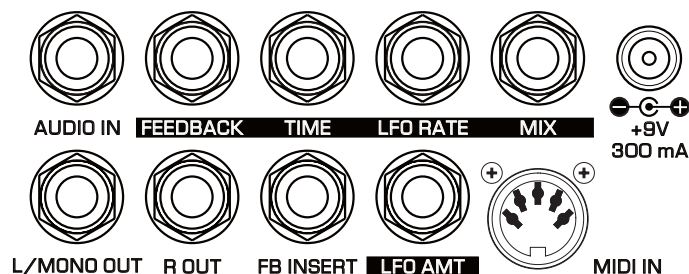
BYPASS - Used to turn the Effect On and Off. When the effect is On, the Bypass LED is Green. When the effect is Off, the Bypass LED is Red.

TAP TEMPO - Dedicated switch used for setting the LFO Rate to a musical tempo. To initiate Tap Tempo control of the LFO, press the Tap Tempo switch three times with the tempo you want (1/4 notes). On the third press, the LFO Rate LED will change to Green, and the LFO will change rates to match the timing of the switch presses. If you continue to press the Tap Tempo switch, the LFO Rate will be set by a running average of the time between switch presses. To start over, wait five seconds and then press the Tap tempo switch three times to set a new tempo. To revert the unit to Panel control, simply move the LFO Rate control. The LFO Rate LED will light up Red, and the LFO will set by the panel control.

Note: When the LFO is synchronized to MIDI Clock messages, Tap Tempo is disabled.

MIDI INDICATOR LED - Lights up Red when the unit receives a MIDI message. Un-implemented MIDI messages do not light up the MIDI LED.

THE CLUSTER FLUX BACK PANEL



AUDIO IN - 1/4" unbalanced audio input. The Cluster Flux accepts signals from Instrument to Line-level.

L/MONO OUT - 1/4" unbalanced audio output. When the effect is on, this output carries the Dry and Wet signal blend set on the front panel Mix control. The level is determined by the Drive and Output Level controls.

Note: The phase of the Wet signal is not inverted in relation to the Dry signal. When the effect is off, the input signal passes only through a high-quality buffer on its way to the output.

R OUT - 1/4" unbalanced audio output. This output can be used as a second

output in Stereo applications. The default configuration is that the Right Output carries a mix of the Dry signal plus the inverted Wet signal. When the outputs are panned hard left and right, this creates a rich stereo effect. In this mode, when both outputs are mixed together and panned to the center the wet signal is cancelled. Refer to the section entitled "Output Configuration" for information on other stereo output modes.

FEEDBACK (FB) INSERT - 1/4" TRS jack designed to be used with a standard insert cable to process the **BBD** feedback signal path separate from the Dry signal path. This is an unbalanced, Line-level output and input. The BBD output signal appears at the tip of the jack, and the return to the device is applied to the ring of the jack. Because these are line level signals, some means of attenuation or amplification may be required if using devices designed for lower signal levels, such as typical guitar stomp-boxes.

FEEDBACK - 1/4" TRS jack that can be used with a Moog EP-2 expression pedal, or a 0V to +5V control voltage on a standard TS cable

To change the feedback from full negative to full positive via control voltage or expression pedal, set the Feedback control to center position.

TIME - 1/4" TRS jack that can be used with a Moog EP-2 expression pedal, or a 0V to +5V control voltage on a standard TS cable

To change the delay time for a selected **RANGE** from longest to shortest via control voltage or expression pedal, set the Delay **TIME** control to center position.

LFO RATE - 1/4" TRS jack that can be used with a Moog EP-2 expression pedal, or a 0V to +5V control voltage on a standard TS cable

To use an expression pedal to modify the LFO Rate (0.5 Hz to 50 Hz) set the LFO Rate to center position. Rotate the **LFO RATE** knob counterclockwise. With a 0V control voltage applied to the LFO Rate CV input, the LFO Rate can be reduced to half of the minimum panel rate. (0.25 Hz) Now rotate the LFO Rate control fully Clockwise. With a +5V control voltage applied to the LFO Rate CV input, the LFO Rate can be increased to double the maximum panel rate. (100 Hz)

LFO AMOUNT - 1/4" TRS jack that can be used with a Moog EP-2 expression pedal, or a 0V to +5V control voltage on a standard TS cable

To modify the **LFO AMOUNT** from minimum to maximum via control voltage or expression pedal, set the **LFO AMOUNT** control to center position

MIX - 1/4" TRS jack that can be used with a Moog EP-2 expression pedal, or a 0V to +5V control voltage on a standard TS cable

To change the Mix from Dry to Wet via control voltage or expression pedal set the MIX control to center position

MIDI IN - Standard 5-pin **DIN** for receiving MIDI Messages from another MIDI device such as a MIDI controller or a computer sequencer.

Refer to the MIDI section of this manual for use of the Cluster Flux with other MIDI devices.

POWER - For connecting to the supplied power adapter

Note: Use only the proper power supply to avoid damage to the device.

Make sure your power supply has the correct Input voltage specifications for your country:

- 120VAC/60 Hz for the US
- 230VAC/ 50 Hz for Europe

The output of the adapter is +9VDC and the adapter should be capable of supplying a minimum of 300mA. The +9VDC is applied to the tip (center) of a barrel connector plug w/ 5.5mm outer diameter and 2.1mm inner diameter. The barrel (outside) of the plug is the ground (-).

MIDI CONTROL OF THE MF-108M

The following section explains the MIDI implementation of the Cluster Flux.

For information about what MIDI is and how it works, you can go to the following webpage for tutorials: www.midi.org/aboutmidi/tutorials.php

MIDI CHANNEL

The default MIDI Channel for the MF-108M is Channel one.

To change this, press and hold both the Tap Tempo and Bypass switches. While holding both, send a MIDI Channel mode message to the Cluster Flux on the desired MIDI channel. The MIDI LED will flash green indicating that the message has been received. The MF-108M will now only receive MIDI messages on that channel. The current MIDI Input channel is stored in memory on power down.

Note: MIDI Clock and System Exclusive messages are NOT Channel Mode messages, and are received by the Cluster Flux regardless of the current MIDI Input Channel.

MIDI CONTROL CHANGE (CC) MESSAGES

The settings of the Cluster Flux can be controlled by MIDI Control Change (CC) messages. In addition to the front panel controls, there are a number of advanced features that can be enabled and edited with Control Change messages.

A MIDI CC message has both a CC# from 0 to 127 and a value from 0-127.

The CC values that affect panel controls replace the physical setting of the front panel controls. When the corresponding front panel control is changed after receiving a MIDI CC message, the value will return to that panel control.

Note- Moving a panel control while receiving MIDI CC messages for that same control will result in conflicting values.

THE FOLLOWING CC MESSAGES CORRESPOND TO PANEL CONTROLS:

CC# 91: Bypass On/Off (0-63=Effect Off 64-127=Effect On)

CC# 7 (MSB)/ **CC#39** (LSB): Output Level Control

CC# 14 (MSB)/ **CC#46** (LSB): Mix Control

CC# 12 (MSB)/ **CC#44** (LSB): Delay Time

CC# 74: Range (Flange/Chorus) (0-63=Flange, 64-127=Chorus)

CC# 13 (MSB)/ **CC#45** (LSB): Feedback

CC# 70: LFO Waveform (0-15=Sine, 16-31=Triangle, 32-47=Square, 48-63=Saw, 64-79=Ramp, 80-95=Random Stepped, 96-127=Smoothed Random (Not available on Front panel))

CC# 15 (MSB)/ **CC# 47** (LSB): LFO Rate

CC# 16 (MSB)/ **CC# 48** (LSB): LFO Amount

THE FOLLOWING CC MESSAGES DO NOT CORRESPOND TO FRONT PANEL CONTROLS, BUT EXTEND THE CLUSTER FLUX'S CAPABILITIES.

The Delay Time Range Multiplier multiplies the delay time by 2, 4 or 8 vastly extending delay time. This feature is for obtaining unusual/ Lo-fi echo effects. When the delay time is increased past the default maximum delay time available on the front panel, the BBD Clock signal will be audible

CC# 5 (MSB)/ **CC#37** (LSB) Delay Time Portamento. This CC sets the rate of change of Delay time by all controls (Delay Time control, Delay Time CV, LFO, and MIDI control of Delay time). Larger values slow down the rate of change, creating a "glide" effect for the Delay time. The default value on each power cycle is 0

CC# 75: Delay Time Range Multiplier (0-31=Normal, 32-63= x2, 64- 95=x4, 96-128=x8.

CC# 76: MIDI Sync Enable (0=Disabled, 64=Enabled (default) Disable MIDI Sync of the Cluster Flux LFO using MIDI Real Time Clock messages. MIDI Sync is enabled each time the unit is powered up.

CC# 71: LFO Clock Divisions. Here is a list of values and associated rhythmic divisions achieved with this CC.

CC#71 VALUE	CLOCK DIVISION	CC#71 VALUE	CLOCK DIVISION
0-5	1/32 Triplet	66-71	Dotted 1/4
6-11	1/32 Note	72-77	1/2 Note
12-17	1/16 Triplet	78-83	Whole Triplet
18-23	1/16 Note	84-89	Dotted 1/2
24-29	1/8 Triplet	90-95	Whole Note
30-35	Dotted 1/16	96-101	Whole + 1/4
36-41	1/8 Note	108-113	Dotted Whole
42-47	1/4 Triplet	108-113	WH+Dotted 1/2
48-53	Dotted 1/8	114-119	2 Whole Notes
54-59	1/4 Note	120-125	3 Whole Notes
60-65	1/2 Triplet	126-127	4 Whole Notes

CC# 72: LFO Phase Reset- Sending any value of this CC message will restart

the LFO from the beginning of its waveform.

CC# 73: Enable LFO Note Reset (0=Disabled, 64=Enabled) Enable or disable the restarting of the LFO from the beginning of its waveform when the unit receives a MIDI Note On message. When changed, the value is stored to memory when the unit is powered down. Default is disabled

CC# 77 Enable MIDI Note mode (0=Disabled, 64=Enabled (default))- Enable/Disable MIDI notes setting the delay time of the unit. Each time the unit is powered on it defaults to enabled.

CC# 78 Enable MIDI Note Spillover mode (0=Disabled (default), 64=Enabled) Allows MIDI Notes to act as a momentary bypass switch. When enabled, a MIDI Note On message turns the effect on. A MIDI Note Off message stops audio from entering the effect, but does not disable monitoring of the effect signal. When combined with enough Feedback, this mode can be used to rhythmically “punch in” ringing comb filter or lo-fi delay effects.

MIDI NOTE MODES - The Cluster Flux delay time can be controlled from MIDI Note On messages. Tuned comb filter effects using the Flange or Chorus mode can be played from a keyboard or sequencer. When this mode is enabled the unit receives a MIDI “Note On” message. The “Note ON” number determines the Delay time. The unit responds to MIDI note numbers 0 to 90. The MIDI Note On Velocity value is ignored.

MIDI CLOCK SYNC - The LFO can be synchronized to MIDI System Real-time Clock messages. These messages are 24 ppq messages that can be sent via MIDI computer sequencers or from drum machines. To enable the sending of these messages, consult the user manual for your MIDI device. When the Cluster Flux receives MIDI Clock messages, the LFO LED turns Yellow to indicate that it is synchronized to the MIDI Clock tempo. When the LFO is synchronized to a MIDI Clock tempo, the LFO can be set to divisions of this tempo. This is either from the front panel LFO Rate control, or from MIDI CC# 71.

MIDI SysEx MESSAGES - used for updating or finding out the units’ firmware version. For more information about this, refer to user notes with any firmware updates posted in the Cluster Flux section of the moogmusic.com website

PEDAL INPUTS

All pedal control input jacks are 1/4” tip-ring-sleeve phone jacks. The sleeve is grounded and the ring terminals are supplied with +5 volts which is current-limited. The tip terminals receive the variable voltages from the pedals.

An expression pedal for use with the MF-108M should contain a 50KOhm or 100KOhm linear taper potentiometer.

Applying a varying voltage to a pedal control input jack has the same effect as turning the corresponding knob. With the panel controls set to mid-position, a voltage change of about 5 volts is equal to turning the corresponding knob through its entire range.

Note that with the Cluster Flux, you may use standard TS cables for control voltages at the same time as Expression pedals.

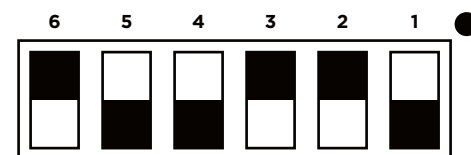
OUTPUT CONFIGURATION

The Right Output of the Cluster Flux is shipped from the factory having a Mix of Dry signal and phase inverted Wet signal from the output of the BBDs. This is so the left and Right outputs can be panned hard left and right for a very nice stereo effect. The Right output can be configured in other ways with the **DIP** switches located on the Circuit board of the unit.

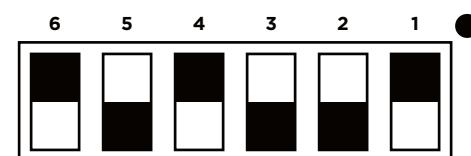
Any damage that occurs to the unit while changing the configuration from the factory setting is not covered under the Warranty.

The bottom of the unit can be taken off by removing the four screws and rubber feet. The Output DIP Switch offers four configurations as illustrated

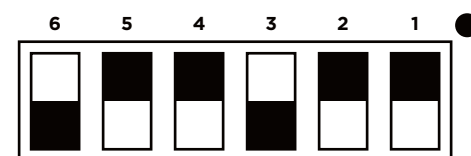
DEFAULT OUTPUT CONFIGURATION: RIGHT OUTPUT & MIX ENABLED; WET SIGNAL OUT OF PHASE



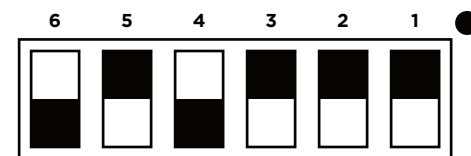
RIGHT OUTPUT & MIX ENABLED; DRY SIGNAL OUT OF PHASE



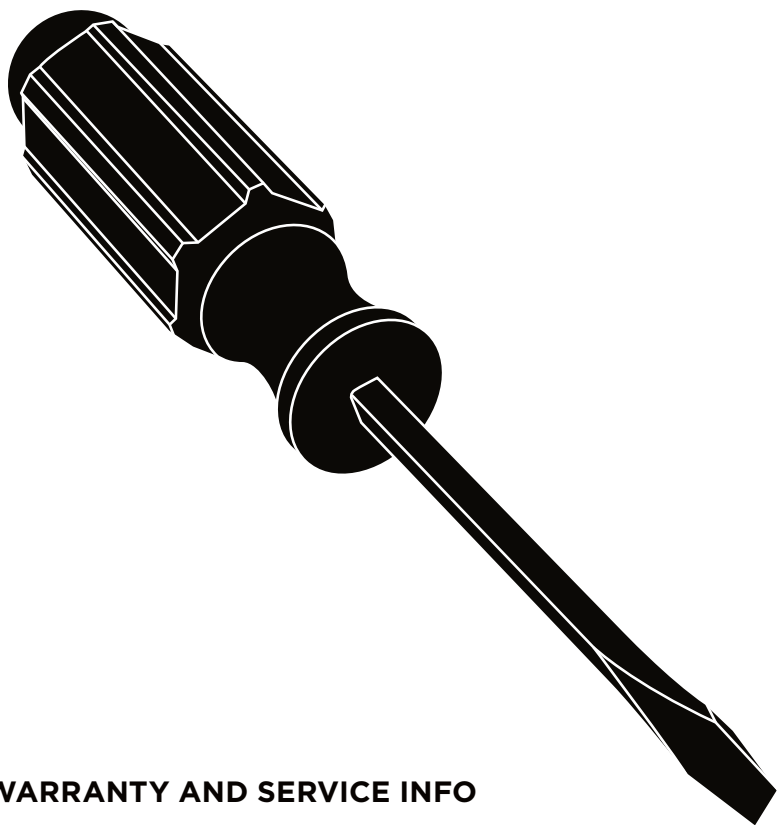
RIGHT OUTPUT DRY & MIX DISABLED; WET SIGNAL IN PHASE



RIGHT OUTPUT DRY & MIX DISABLED; WET SIGNAL OUT OF PHASE



Note: Do not set the Output configuration switch to any settings other than these



WARRANTY AND SERVICE INFO

LIMITED WARRANTY

Moog Music warrants that its products will be free from defects in materials or workmanship, and shall conform to specifications current at the time of shipment, for a period of one year from date of purchase. During the one-year period, any defective products will be repaired or replaced, at Moog Music's option, on a return-to-factory basis. This Warranty covers defects that Moog Music determines are no fault of the user.

RETURNING YOUR MF-108M FOR REPLACEMENT/REPAIR

You must obtain prior approval and an RMA number from Moog Music before returning any product to us. Wrap your MF-108M carefully and pack it with the power adapter in its original carton.

The warranty will not be honored if the product is not properly packed. Send it to Moog Music with transportation and insurance charges paid.

A reasonable cost for service, materials and return freight will be charged to replace materials defective through the fault of the user, or for which the one year warranty period has expired.

Transportation and insurance charges from Moog Music to your United States address, of products repaired or replaced under warranty will be paid by Moog Music.

APPENDIX: SPECIFICATIONS

The Cluster Flux is a 100% analog signal path delay device with two NOS, high voltage BBDs tuned for optimum response in the Chorus and Flange times. It features extensive time modulation and MIDI capabilities.

FRONT PANEL

- TIME:** Adjust delay time 0.6mS to 10mS in Flange mode and 5mS to 50mS in Chorus mode.
- RANGE:** Select between Flanger and Chorus mode
- FEEDBACK:** Continuous control from no feedback to infinite feedback. Bi-Polar control allows the feedback to highlight even or odd harmonics.
- DRIVE:** Allows between -7dB and +28dB of gain or attenuation of the input signal for optimum signal path, level matching and distortion sounds.
- OUTPUT:** Allows gain and attenuation of output signal for compatibility with a wide range of input devices.
- MIX:** Cross fader control to vary the amount of wet or dry signal heard on output.
- LFO:** Six position rotary switch to select the LFO wave shape for delay time modulation. Select between Sine, Triangle, Square, Ramp, Saw and Random stepped modulation.
- LFO RATE:** Adjust the LFO rate from the sub audio to audio rates. Control from 0.05 Hz to 50 Hz from the front panel (more from the CV).
- LFO AMOUNT:** Controls the amount of LFO modulation of the delay time.

LEDs AND SWITCHES

- RATE:** A Bi-Color LED to display the rate and shape of the LFO wave as well as the source of control.
- MIDI:** A Bi-Color LED to display the presence of MIDI control.
- LEVEL:** A Bi-Color LED to display the level if the input signal post drive control for optimum processing level.
- BYPASS:** A Bi-Color LED to indicate if the effect is engaged or not.
- TAP TEMPO:** A rugged smooth-acting stomp switch for setting LFO rate.
- BYPASS SWITCH:** A rugged smooth-acting stomp switch bypassing the unit with a buffered input.

BACK PANEL FEATURES

- AUDIO IN:** 1/4" phone jack - accepts any instrument-level to line-level audio signals.
- LEFT / MONO AUDIO OUT:** 1/4" phone jack 1/4" phone jack with adjustable output level for instrument or line level output.
- RIGHT / Stereo OUT:** A Second output dip switch configurable for either Stereo out (two types), Delay only out, or dual mono out.
- FEEDBACK, TIME, LFO RATE, MIX, LFO AMOUNT** all of which are stereo 1/4" jacks that accept Moogerfooger EP-2 (or equivalent) expression pedals, or 0-5V control voltages from either two-circuit or three-circuit 1/4" jacks.
- FEEDBACK INSERT:** A 1/4" TRS Insert jack for inserting effects in the feedback loop of the delay chain. Line level output.

- **MIDI IN:** A 5 Pin **DIN** input for controlling the MF-108 via MIDI Control.
 - **+9V POWER INPUT JACK** - accepts standard 9 volt center positive barrel power adaptor (power adaptor included). 300mA minimum required.
- General Specifications
- **CASE:** Rugged steel case with black powder coat panel, white silk screen and hardwood sides for a classic analog appearance.
 - **DIMENSIONS:** 9" x 6" x 2-1/2"
 - **NET WEIGHT:** 4 lbs.
 - **SHIPPING WEIGHT:** 6 lbs, including power adaptor and instruction manual.
 - **POWER REQUIREMENTS:** 105-125 volt, 3W. 220 volt power adaptor available on special order.

Note: Specifications subject to change without notice.

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